REMARKS

Claims 17-18 have been added. Claims 1-18 are pending in the application. Applicants gratefully acknowledge the indicated allowability of claims 3, 5-7 and 14. Reexamination and reconsideration, however, of the rejected claims are respectfully requested.

Initially, claims 1-16 were rejected under 35 U.S.C. §112, second paragraph, as allegedly being indefinite and/or incomplete. Applicants respectfully traverse this rejection.

Each of independent claims 1 and 11 recite both a rotor position estimator and a mobile body position estimator. Method claim 8 likewise recites the steps of estimating a magnetic pole position of a rotor and estimating the position of the mobile body. These two claimed components or steps are functionally coupled to one another. As noted in claims 1 and 8, the rotor position estimator estimates a magnetic pole position of a rotor. The mobile body position estimator utilizes the magnetic pole position of the rotor from the rotor position estimator in order to estimate the position of the mobile body. Additionally, claim 11 recites a motor speed command generator which controls the speed of the synchronous motor based on a position command and the position of the mobile body estimated by the mobile body position estimator. Regarding method claim 8, the first step estimates the magnetic pole position of the rotor and the second step estimates the position of the mobile body based on the magnetic pole position estimated in the first step. Accordingly, Applicants submit the claimed elements recited in independent claims 1, 8 and 11 are functionally connected and, thus, no essential elements have been omitted.

In that regard, Applicants have added additional independent claims 17 and 18 substantially corresponding to independent claims 1 and 8, respectively. These claims 17 and 18 further recite the functional relationship wherein the estimated position from the mobile body position estimator is usable to control the mobile body.

In the Office Action, claims 1, 2, 4, 8, 9 and 10-16 were rejected as obvious over ACARNLEY (US 6,005,364) in view of TAUCHI et al. (US 6,328,136). Applicants respectfully traverse this rejection in view of the following remarks.

As recited in independent claims 1 and 8, Applicants' invention provides a controller for a mobile body that includes a rotor position estimator (for example 301 shown in Fig. 1) and a mobile body position estimator. The rotor position estimator estimates a magnetic pole position of a rotor of a synchronous motor that drives the mobile body based on electrical quantities in relation to electric power supplied to the synchronous motor. The mobile body position estimator estimates the position of the mobile body based on the magnetic pole position estimated by the rotor position estimator 301.

Hence, in Applicants' invention, the mobile body position estimator does not estimate the position of the mobile body directly, but rather estimates it based on the magnetic pole position which itself was estimated by the rotor position estimator based on electrical quantities in relation to the electric power supplied to the synchronous motor. Neither ACARNLEY nor TAUCHI disclose or suggest such features, whether taken alone or in combination.

Regarding ACARNLEY, there is shown a "position estimator" 16. However, this position estimator 16 corresponds to Applicants' claimed rotor

position estimator which determines a rotor displacement parameter by electrical rather than mechanical means (col. 1, lines 10-14). ACARNLEY does not, however, disclose any mobile body position estimator let alone one that estimates a position of a mobile body based on the magnetic pole position estimated by the rotor position estimator. As shown in Figure 1 of ACARNLEY, the output of the position estimator 16 is fed directly to the controller 18 for providing three-phase power supply to the motor 10 (col. 6, lines 28-44). The position estimation mentioned in Figure 2 of ACARNLEY simply refers to the position estimation of the rotor position estimator, not of any mobile body position estimator.

Nor are any of these deficiencies in ACARNLEY remedied by the TAUCHI et al. reference. TAUCHI discloses a switch 27 used to detect a magnetic position together with a rotary encoder 29 that serves as a rotation detector. In TAUCHI, however, the rotary encoder 29 detects the rotation of a winder directly, and does teach or suggest using magnetic pole position by the switch 27 in order to detect rotation of the winder. In that regard, the Examiner's statement that "TAUCHI et al. disclose a mobile body position estimator which estimates the position of a mobile body (2) based on the magnetic pole position estimated by said rotor position estimator" is incorrect. Those passages cited by the Examiner, for example, col. 1, line 62 - col. 2, line 3, directly detect the magnetic pole position of the field permanent magnet 14 by an absolute value encoder 20. They do not suggest or teach the use of a rotor position estimator which estimates a magnetic pole position of a rotor based on electrical quantities in relation to electric power supplied to the synchronous motor. In that regard,

the characteristic feature of Applicants' invention wherein the mobile body position estimator estimates the position of the mobile body based on the magnetic pole position estimated by the rotor position estimator is not found or suggested in TAUCHI et al.

In view of the foregoing, Applicants submit independent claims 1 and 11 are patentable over ACARNLEY in view of TAUCHI et al.

Additionally, Applicants' independent method claim 8 likewise recites the step of estimating the position of the mobile body based on the magnetic pole position estimated in the prior step, i.e., the step of estimating a magnetic pole position of a rotor of the synchronous motor based on electrical quantities. Such a step is likewise not taught or suggested by either ACARNLEY or TAUCHI et al.

In view of the above, Applicants submit independent claims 1, 8 and 11 are patentable over ACARNLEY in view of TAUCHI et al. Further, claims 2-7, 9-10 and 12-16 respectively depend from these independent claims and are also submitted to be allowable. Finally, Applicants' newly added independent claims 17 and 18 substantially correspond to claims 1 and 8 and are therefore also submitted to be in condition for allowance.

For the foregoing reasons, Applicants submit claims 1-18 are now in condition for allowance. An early notice to that effect is solicited.

Summarizing, Applicants have made an important contribution to the art to which the present subject matter pertains, for which no counterpart is shown in any of the art or combination of same. The invention is fully set forth and carefully delimited in all claims in this case. Under the patent statute,

Applicants should not be deprived of the protection to which they are entitled for this contribution. Accordingly, it is respectfully requested that favorable reconsideration and an early notice of allowance be provided for all remaining claims.

If there are any questions regarding this amendment or the application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response, and please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1323 (Docket #381NP/50449).

Respectfully submitted,

January 6, 2003

Jeffrey D. Sanok
Registration No. 32,169

CROWELL & MORING, LLP
P.O. Box 14300
Washington, DC 20044-4300
Telephone No.: (202) 624-2500
Facsimile No.: (202) 628-8844

JDS:pct
CAM # 056207.50449US

VERSION WITH MARKINGS TO SHOW CHANGES MADE

Please amend claim 11 as follows:

11. (Amended) A mobile body system, comprising:

a mobile body driven by a synchronous motor; and

a controller which controls the speed of said synchronous motor so that the position of said mobile body [approach] approaches the position command,

said controller having

a rotor position estimator which estimates a magnetic pole position of a rotor of said synchronous motor based on electrical quantities in relation to electric power supplied to said synchronous motor,

a mobile body position estimator which estimates the position of said mobile body based on the magnetic pole position estimated by said rotor position estimator, and

a motor speed command generator which controls the speed of said synchronous motor based on the position command and the position of said mobile body estimated by said mobile body position estimator.